New Hampshire Department of Safety Division of Fire Standards & Training And Emergency Medical Services

Recommended Curriculum for

Laryngeal Mask Airway (LMA) The Role of the NH

EMT-Intermediate EMT - Paramedic

July 2005

NH Fire Standards & Training and Emergency Medical Services Toll Free: 1-888-827-5367

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Module Overview

Student Eligibility

Emergency Medical Technicians licensed as Intermediates or Paramedics that perform endotracheal intubation in the State of New Hampshire.

Course Format

Although this material may be presented in a number of formats, other programs such as ACLS, PALS, BTLS etc. my not be substituted for this module.

Credits

Massachusetts Office of Emergency Medical Services, Boston, MA. Walter Reed Army Medical Center Department of Anesthesiology, Washington, DC

Objectives

Upon completion of the training Module, the provider will be able to:

- Discuss the New Hampshire Advanced Airway Management Protocol.
- Identify the indications, contraindications and side effects of placing a LMA.
- Identify the equipment necessary for the placement of an LMA.
- Discuss the steps necessary to prepare for LMA placement.
- Describe the procedure of placing a LMA.
- Identify and discuss problems associated with LMA placement.
- Demonstrate the placement of a LMA tube in an intubation manikin in a classroom setting.
- Successfully place the LMA device in a mannequin under the direct supervision of a licensed practitioner authorized to use the device.
- AND/OR
- Successfully place the LMA device in an operating room setting under the direct supervision of a qualified MD, CRNA or other licensed practitioner authorized to use the device.

Motivation:

EMS providers play an important role in the delivery of emergency care and are expected
to provide care that is consistent with that provided within an Emergency Department (ED).
Correct and timely airway management is one of the most important techniques utilized in
the field. The NH protocol for LMA placement attempts to align prehospital practice with
ED care in NH and further address patients' needs.

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Teaching Methods

- 1. Lecture / Discussion
- 2. Video Tape Presentation
- 3. Practical Skill Sessions / Stations
- 4. Open Question and Answer Periods
- 5. Clinical Application in a Mannequin (Required)
- 6. Clinical Application in Operating Room (**Optional**)

AV Equipment:

Use various audio-visual materials relating to injuries of the head and spine. The
continuous design and development of new audio-visual materials relating to EMS requires
careful review to determine which best meet the needs of the program. Materials should
be edited to assure meeting the objectives of the curriculum.

Primary Instructor

 Any New Hampshire provider currently authorized to perform the skill of Laryngeal Mask Airway insertion. This may include MD, PA, or RN. EMT-Paramedics or EMT-Intermediates who have previously completed this Module and are knowledgeable in the NH Patient Care Protocol for Advanced Airway Management Protocol/Failed Airways Options are also eligible.

Assistant Instructor

• The instructor-to-student ratio should be 1:6 for psychomotor skill practice. This may include MD, PA, or RN. EMT-Paramedics, EMT-Intermediates or EMT-Basics who have previously completed this Module and are knowledgeable in the NH Patient Care Protocol for Advanced Airway Management Protocol/Failed Airways Options are also eligible.

Instructor Activities

- Supervise student practice.
- Reinforce student progress in cognitive, affective, and psychomotor domains.
- Redirect students having difficulty with content.

Evaluation

Written: Develop evaluation instruments, e.g., quizzes, verbal reviews, handouts, to determine if the students have met the cognitive and affective objectives of this lesson.

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Practical: Evaluate the actions of the EMT students during role play, practice or other skill stations to determine their compliance with the cognitive and affective objectives and their mastery of the psychomotor objectives of this lesson.

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Remediation Identify students or groups of students who are having difficulty with this subject

content and work with student(s) until they have met the cognitive, affective and

psychomotor objectives of this lesson.

Enrichment Identify what is unique in the local area concerning this topic and incorporate

into local training modules.

Time Recommended Minimum Time to Complete: Four hours

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References

Texts:

- Brady Basic Trauma Life Support, Fourth Edition, Campbell, John E., Prentice-Hall, Inc., 2000, pages 58-59, 292-294
- Brady Paramedic Care: Principles & Practice, Volume 1: Introduction, Bledsoe, Bryan E., Porter, Robert S., Cherry, Richard A., Prentice-Hall, Inc., 2000, pages 573-574.
- Emergency Medicine: Concepts and Clinical Practice, Fourth Edition, Rosen, Peter, Editor-in-Chief, 1998, pages 14-15.
- Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care, An International Consensus on Science, International Liaison Committee on Resuscitation, Supplement to Circulation, Volume 102, Number 8, August 22, 2000, pages I-98-99.
- LMA Classic and LMA Flexible Instruction Manual, Rev. B, Brain A., Denman W., Goudsouzian N., LMA North America, Inc., Part Number 3000192, March 2000.
- LMA Fastrach Instruction Manual, Rev. A, Brain A., Verghese C., LMA North America, Inc., Part Number 3000158, August 1998.
- Paramedic Textbook, Second Edition, Sanders, Mick J., Mosby, Inc., 2000, pages 412.
- PHTLS Basic and Advanced Prehospital Trauma Life Support, Forth Edition, Prehospital Trauma Life Support Committee of the National Association of Emergency Medical Technicians in cooperation with the Committee on Trauma of the American College of Surgeons, Mosby, Inc., 1999, page 67.
- Textbook of Advanced Cardiac Life Support, Cummins, Richard O., Editor, America Heart Association, 1997, page 2-11.

Journal Articles:

- "A comparison of two airway aids for emergency use by unskilled personnel, the Combitube and laryngeal mask," Yardy N, Hancox D, Strang T, Anaesthesia, 1999 Feb; 54(2): 181-3.
- "The PTL, Combitube, laryngeal mask, and oral airway: a randomized prehospital comparative study of ventilatory device effectiveness and cost-effectiveness in 470 cases of cardiorespiratory arrest," Rumball CJ, MacDonald D, Prehospital Emergency Care, 1997 Jan-Mar; 1(1) 1-10.
- "Airway management during cardiopulmonary resuscitation a comparative study of bag-valve-mask, laryngeal mask airway, and Combitube in a bench model," Doerges V, Sauer C, Ocker H, Wenzel V, Schmucker P, Resuscitation, 1999 Jun; 41(1): 63-9.
- "Use of Intubating Laryngeal Mask Airway by Medical and Non-medical Personnel," Levitan R, Ochroch E, Stuart S, Hollander J, American Journal of Emergency Medicine, 2000 Jan; 18(1): 12-16.
- "The Intavent Larvngeal Mask Instruction Manual". Brain. AlJ: 1992.
- "The LMA Alternative". Windham, W:. JEMS. 1998.
- "The LMA Unmasked". Brocato, C: JEMS 1998.

Video:

- "LMA Insertion Video, Rev. A," LMA North America, Inc., Part Number 3000200.
- "LMA-Fastrach Instructional Video, Rev. A," LMA North America, Inc., Part Number 3000175.
- "Taking Care of Reusable LMA Airways, Rev. A," LMA North America, Inc., Part Number 9000005.

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Module Outline

I. Overview

- A. Welcome and Introduction of faculty
- B. Self-Introduction of participants
- C. Review of Objectives

II. Introduction of Device

- A. Introduction of LMA Procedure Protocol
- B. History
 - 1. The LMA was invented by Dr. Archie Brain at the London Hospital in Whitechapel in 1981
 - 2. It has been successfully used in the operating room since then.
 - 3. The first EMS system in the US to use the LMA was Savannah, GA in early 1990s.
 - 4. Commonly employed prehospitally as a failed intubation alternative.

III. Review of pertinent anatomy and physiology

- A. Upper airway structures
- B. Upper gastrointestinal tract
- C. Airway grading

IV. Documentation of Procedure

- A. Documentation may include:
 - 1. Time procedure was performed
 - 2. LMA type and size utilized
 - 3. Tube placement check, and by what manner
 - 4. Degree of difficulty encountered
 - 5. Complications encountered
 - 6. Name of provider performing procedure

V. LMA manufacturer's video instruction

A. Video appropriate to the device to be utilized.

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VI. Equipment and Procedure

A. Equipment

- 1. Body Substance Isolation equipment
- 2. Laryngeal Mask Airways of appropriate sizes
- 3. Syringe with appropriate volume for LMA cuff inflation
- 4. 10 or 12 Fr suction catheter
- 5. Water-soluble lubricant
- 6. Tape or other device(s) to secure LMA
- 7. Stethoscope
- 8. Ventilation equipment
- 9. Oxygen source
- 10. Suction device

B. Indications

- 1. When short-term airway control is desired (e.g. minor surgical procedure).
- 2. Airway control in the absence of other effective methods (e.g. failed airway).
- 3. Situations involving a difficult mask (BVM) fit.
- 4. May be used as a "second-last-ditch" airway where a surgical airway is the only remaining option.

C. Contraindications

- 1. The known contraindications:
 - a) Patients at risk of aspiration.
 - b) Patients with fixed pulmonary compliance (e.g. pulmonary fibrosis, massive thoracic injury).
 - Patients who are not profoundly unconscious and who may resist LMA insertion.
 - d) Severe maxillofacial or oropharyngeal trauma.
 - e) Greater than 14 to 16 weeks pregnant

NOTE: Not all contraindications are absolute

- 2. Warnings, Cautions, and Adverse Effects
 - a) Throat soreness
 - b) Dryness of the throat and/or mucosa
 - c) Aspiration

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D. Step 1: Size Selection

- 1. Verify that the size of the LMA is correct for the patient
- 2. Recommended Size guidelines:

 Size 1:
 under 5 kg

 Size 1.5:
 5 to 10 kg

 Size 2:
 10 to 20 kg

 Size 2.5:
 20 to 30 kg

Size 3: 30 kg to small adult

Size 4: adult

Size 5: Large adult/poor seal with size 4

E. Step 2: Examine the LMA

- 1. Visually inspect the LMA cuff for tears or other abnormalities
- 2. Inspect the tube to ensure that it is free of blockage or loose particles
- 3. Deflate the cuff to ensure that it will maintain a vacuum
- 4. Inflate the cuff to ensure that it does not leak

F. Step 3: Deflation & Inflation

- Slowly deflate the cuff to form a smooth flat wedge shape that will pass easily around the back of the tongue and behind the epiglottis.
- 2. During inflation the maximum air in cuff should not exceed:

 Size 1:
 4 ml

 Size 1.5:
 7 ml

 Size 2:
 10 ml

 Size 2.5:
 14 ml

 Size 3:
 20 ml

 Size 4:
 30 ml

 Size 5:
 40 ml

G. Step 4: Lubrication

- 1. Lubricate the LMA with a water soluble lubricant
- 2. Only lubricate the LMA just prior to insertion
- 3. Lubricate the back of the mask thoroughly

NOTE: Avoid excessive amounts of lubricant on the anterior surface of the cuff or in the bowl of the mask to reduce the risk of obstruction.

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H. Step 5: Positioning of the Airway

- 1. Extend the head and flex the neck
- 2. Avoid LMA fold over.
- 3. Assistant pulls the lower jaw downwards.
- 4. Visualize the posterior oral airway.
- 5. Ensure that the LMA is not folding over in the oral cavity as it is inserted.

I. LMA Insertion Technique

1. Step 1

- a) Grasp the LMA by the tube, holding it like a pen as near as possible to the mask end.
- b) Place the tip of the LMA against the inner surface of the patient's upper teeth

2. Step 2

- a) Under direct vision, press the mask tip upward against the hard palate to flatten it out.
- b) Under direct vision, using the index finger, keep pressing upwards as you advance the mask into the pharynx to ensure the tip remains flattened and avoids the tongue.

3. Step 3

- a) Keep the neck flexed and head extended:
- b) Press the mask into the posterior pharyngeal wall using the index finger.

4. Step 4

- a) Continue pushing with your index finger.
- b) Guide the mask downward into position.

5. Step 5

- a) Grasp the tube firmly with the other hand then withdraw your index finger from the pharynx.
- b) Press gently downward with your other hand to ensure the mask is fully inserted.

6. Step 6

- a) Inflate the mask with the recommended volume of air.
- b) Do not over-inflate the LMA.

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- Do not touch the LMA tube while it is being inflated unless the position is obviously unstable.
- d) Normally the mask should be allowed to rise slightly out of the hypopharynx as it is inflated to find its correct position.

7. Step 7

- a) Connect the LMA to a Bag-Valve Mask device or low pressure ventilator
- b) Ventilate the patient while confirming equal breath sounds over both lungs in all fields and the absence of ventilatory sounds over the epigastrium
- c) Place a bite-block or roll of gauze to prevent occlusion of the tube should the patient bite down.
- d) Secure the LMA using the same techniques as those employed in the securing of an endotracheal tube.
- e) During ventilation observe end-tidal CO2 monitor and/or pulseoximetry to confirm oxygenation

J. Problems with LMA Insertion

- 1. Failure to press the deflated mask up against the hard palate or inadequate lubrication or deflation can cause the mask tip to fold back on itself.
- 2. Once the mask tip has started to fold over, this may progress, pushing the epiglottis into its down-folded position causing mechanical obstruction.
- 3. If the mask tip is deflated forward, it can push down the epiglottis causing obstruction.
- 4. If the mask is inadequately deflated it may either push down the epiglottis or penetrate the glottis.

VII. Summary

- A. Studies suggest that the LMA is an airway device that prehospital providers "adapt to rapidly" and have demonstrated success.
- B. Though endotracheal intubation remains the definitive technique for securing an airway in the prehospital setting, the LMA may be life saving when intubation has failed or is not available.

VIII. Student practical skill sessions/stations

A. Using training manikin capable of accepting a LMA.

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B. Scenario-based skill sessions using case studies. (Sample cases follow this outline).

IX. Written and/or Practical Examination

X. Review, Questions and Answers

XI. Optional Clinical Experience (4 - 8 hours)

- A. Complete four to eight hours of clinical time in an operating room focusing on airway management issues, complications, and tricks.
- B. Successfully place the LMA device in three patients in an operating room setting under the direct supervision of a qualified MD, CRNA or other licensed practitioner authorized to use the device.
- C. Document the LMA placement attempted/completed during the clinical experience.

XII. Total Module Time - Didactic: 130 to 270 minutes

XIII. Total Optional Time - Clinical: 8 hours

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XIV. Sample Cases

Case One

A 37-year-old female patient collapsed in her living room. She is in cardiac arrest and routine ACLS care is in progress. You have been unable to intubate the patient's tracheal after multiple attempts, and your attempts at bag-valve-mask ventilation are inadequate. Using the manikin and materials provided, describe and perform all airway maintenance procedures indicated by New Hampshire Protocol.

Case Two

A 15-year-old female pedestrian was struck by a motor vehicle at a moderate speed. She unconscious to deep painful stimuli and is suffering from severe facial trauma. Your efforts at maintaining the patient's airway with BLS techniques and generous suctioning are inadequate. Using the manikin and materials provided, describe and perform all airway maintenance procedures indicated by New Hampshire Protocol.

Case Three

You have been unable to intubate a 55 year-old male patient unconscious after receiving a gunshot wound to the thorax. You are having difficulty maintaining the patient's airway using BLS methods. Using the manikin and materials provided, describe and perform all airway maintenance procedures indicated by New Hampshire Protocol.

Case Four

A 31-year-old male patient was involved in a motorcycle accident. He does not respond verbally, is bleeding from facial injuries, and is combative while lying supine on the roadside. His vital signs are BP 88/P, P134, and R44. Using the manikin and materials provided, describe and perform all airway maintenance procedures indicated by New Hampshire Protocol.

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Performance Checklist

Provider's Name	Date		
NH License Number #	Level (circle)	EMT-I	EMT-P
Service			
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When demonstrating the insertion of a L	aryngeal Mask Ai		
Verbalizes the indications for the Airway		P <u>as</u>	ss Fail
Verbalizes the contraindications for the Airway			\rightarrow
Proper use of PPE			
Assembles all necessary equipment			
Selects appropriate LMA size			\rightarrow
Ventilates patient prior to insertion			\rightarrow
Properly prepares LMA for use, including proper	er cuff deflation		\rightarrow
Lubricates tube on posterior surface only			\rightarrow
Opens and clears airway and positions head pr	operly		\rightarrow
Inserts device properly into oropharynx and adv	vances correctly		\rightarrow
Inflates cuff / pilot balloon to achieve proper sea	al		
Ventilates effectively and auscultates breath so	unds		
Verbalizes appropriate breath sounds for correct	ct placement		
Properly utilizes bite block device			>
Properly secures device in place			
Utilizes end-tidal carbon dioxide detection device	ce		\rightarrow
Verbalizes proper suctioning method			\rightarrow
Final Performance		PAS	SS FAIL
Comments			>
Instructor / Examiner Print Name			
Instructor / Examiner Signature			Credentials
manucion / Lammer Signature		 Date	

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